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**UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF NEW YORK**

NETWORK-1 TECHNOLOGIES, INC.

Plaintiff,

- against -

GOOGLE LLC and YOUTUBE, LLC

Defendants.

14 Civ. 2396 (PGG-SN)

14 Civ. 9558 (PGG-SN)

**DEFENDANTS' MEMORANDUM OF LAW IN SUPPORT OF THEIR  
MOTION FOR SUMMARY JUDGMENT**

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When Network-1 launched this litigation in 2014, it accused Google’s Content ID system of infringing thirty patent claims. Following proceedings before the U.S. Patent and Trademark Office and the U.S. Court of Appeals Federal Circuit, Network-1 dropped most of them. Although Network-1 has asserted several other claims in their place, it is not hard to see why the backup claims now at issue failed to make Network-1’s A-list.

To begin with, most of the currently-asserted claims are invalid because they are indefinite under Section 112 of the Patent Act. *See Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901, 909–10 (2014). Google has explained in its claim construction briefs why the claim term “non-exhaustive search” fails to satisfy the definiteness requirement, and it will not burden the Court by repeating that explanation here. *See* Section I *infra*. For the reasons stated in Google’s papers and at the claim construction hearing, the question whether the term “non-exhaustive search” is indefinite is one for the Court, not a jury. Accordingly, Google respectfully requests that the Court enter summary judgment declaring invalid the asserted claims that include that term. That issue alone disposes of nine of the twelve asserted claims—and two of the three asserted patents—remaining in this litigation.

The remaining three claims asserted by Network-1 are not infringed. This is true for many reasons, but one reason in particular stands out: It is beyond dispute that the accused system does not perform a “sublinear” search, as the claims expressly require. There is no denying that Google’s Content ID system is a complicated piece of technology built on advanced principles of mathematics and computer science. And as an added twist, Google has designed two separate versions of its Content ID system from the ground up—a newer version called “Siberia” and an older one known as the “LSH” version—both of which Network-1 accuses of infringement. But even though the inner workings of the system are complex, the pertinent facts are not in dispute,

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and the case for summary judgment is straightforward. Indeed, the Court need not look beyond the testimony of Network-1's expert witness, Dr. Michael Mitzenmacher, to understand why Google is entitled to summary judgment of non-infringement.

Dr. Mitzenmacher admits, as he must, that the current Siberia version of the Content ID system performs a *linear* search rather than a "sublinear" one. *See* Section II.A *infra*. In fact, the Siberia system uses the same technique of searching a fixed fraction of a data set that Dr. Mitzenmacher invoked last year to illustrate to this Court what it means to conduct a linear search. Network-1's only apparent argument is that, as the system grows, Google could become dissatisfied with its linear nature and alter it in a way that purportedly would result in "sublinear scaling." The law is clear, however, that "[a] device does not infringe simply because it is possible to alter it in a way that would satisfy all the limitations of a patent claim." *Accent Packaging, Inc. v. Leggett & Platt, Inc.*, 707 F.3d 1318, 1327 (Fed. Cir. 2013). And, in any event, the undisputed evidence demonstrates that even Network-1's proposed modifications would not render the search "sublinear" under the agreed construction of that term. *See* Section II.A *infra*.

The prior LSH version of Google's Content ID system is not "sublinear" either. *See* Section II.B *infra*. Dr. Mitzenmacher's analysis of this pivotal element consists of approximately six sentences of conclusory assertions and a Wikipedia webpage. But those six sentences are more than enough to demonstrate that the LSH version of the Content ID system, like the Siberia version, does not perform "[a] search whose execution time scales with a less than linear relationship to the size of the data set to be searched, assuming computing power is held constant." Am. Joint Claim Constr. Chart (Dkt. No. 146) at 2; *see* Section II.B *infra*.

As this Court knows, Network-1 and Google spent several years narrowing the scope of these cases before completing fact discovery last year and expert discovery this summer. The

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result of that winnowing process is that Network-1 is left with a set of patent claims that simply do not map onto either version of Google’s Content ID system. As a consequence, Google is entitled to summary judgment on several additional grounds that are also detailed herein. The most straightforward path is the one sketched above: As a matter of law, the claims containing the term “non-exhaustive search” are invalid because they are indefinite, and the remaining claims are not infringed by either version of the Content ID system because they indisputably do not perform the claimed “sublinear” search. Alternatively, the other grounds on which summary judgment should be granted are set forth in Sections III, IV, and V should the Court find it necessary to reach them. No matter the path taken, Google respectfully submits that the endpoint is the same: Summary judgment in its favor on all of the asserted claims.

**THE LAW OF PATENT INFRINGEMENT**

“A patent infringement analysis involves two steps: (1) claim construction and, (2) application of the properly construed claim to the accused product.” *Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F.3d 1316, 1323 (Fed. Cir. 2001). “To show infringement of a patent, a patentee must supply sufficient evidence to prove that the accused product or process contains, either literally or under the doctrine of equivalents, **every limitation** of the properly construed claim.” *Seal-Flex, Inc. v. Athletic Track & Court Constr.*, 172 F.3d 836, 842 (Fed Cir. 1999) (emphasis added). “[T]he failure to meet a single limitation is sufficient to negate infringement of the claim.” *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1535 (Fed. Cir. 1991).

“Summary judgment of noninfringement is appropriate where the patent owner’s proof is deficient in meeting an essential part of the legal standard for infringement, since such failure will render all other facts immaterial.” *Telemac*, 247 F.3d at 1322; *see also Desper Prods, Inc. v. QSound Labs, Inc.*, 157 F.3d 1325, 1332 (Fed. Cir. 1998) (observing that “[s]ummary judgment is



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as appropriate in a patent case as it is in any other case”); *Consarc Corp. v. Marine Midland Bank, N.A.*, 996 F.2d 568, 572 (2d Cir. 1993) (explaining that “[s]ummary judgment will be granted against a party that has failed to offer proof sufficient to establish the existence of an essential element of its case”). Because “the ultimate burden of proving infringement rests with the patentee, an accused infringer seeking summary judgment of noninfringement may meet its initial responsibility either by providing evidence that would preclude a finding of infringement, or by showing that the evidence on file fails to establish a material issue of fact essential to the patentee’s case.” *Novartis Corp. v. Ben Venue Labs., Inc.*, 271 F.3d 1043, 1046 (Fed. Cir. 2001).

“[T]he party opposing the motion for summary judgment of noninfringement must point to an evidentiary conflict created on the record,” as “[m]ere denials or conclusory statements are insufficient.” *TechSearch, LLC v. Intel Corp.*, 286 F.3d 1360, 1372 (Fed. Cir. 2002). In particular, “[b]road conclusory statements offered by [the patentee’s] experts are not evidence and are not sufficient to establish a genuine issue of material fact.” *Telemac*, 247 F.3d at 1329.

**THE PATENTS-IN-SUIT**

**A. The Specifications of the Patents-In-Suit**

This case involves three related patents that issued between August 2011 and December 2014: U.S. Patent No. 8,010,988 (the “’988 patent”); U.S. Patent No. 8,205,237 (the “’237 patent”); and U.S. Patent No. 8,904,464 (the “’464 patent”). All three patents claim priority to the same provisional patent application filed in September 2000. At a high level of generality, the specifications of the three patents-in-suit describe methods for (1) extracting features from a media work, such as an audio or video file; (2) identifying the work by comparing the extracted features to features extracted from known media works; and (3) taking an action based on the identification of the work. *See* ’988 patent (Ex. 3) 4:31–44, 5:58–6:7.

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With respect to the first step, the patents list several “exemplary techniques for feature extraction.” *Id.* at 7:12–8:2. “In the case of images and video,” for example, the patents explain that the “feature vector might be a pseudo-random sample of pixels from the frame or a low-resolution copy of the frame or the average intensities of  $n \times n$  blocks of pixels.” *Id.* at 7:23–26. The patents do not purport to disclose novel methods of “extracting features” from a work, but rather observe that “[t]he recognition literature contains many different representations” and direct the reader to a pair of texts published in 1973 and 1990. *Id.* at 7:32–33, 7:37–42. The purported inventor of the patents-in-suit, Dr. Ingemar Cox, acknowledged at deposition that the patents do not describe any new feature extraction techniques. Cox Dep. Tr. (Ex. 24) 67:12–17.

The patents likewise do not purport to disclose a new way of “identifying” media works through the comparison of “extracted features.” Instead, they explain that “[t]he recognition system described can be considered to be a form of nearest neighbor search in a high dimensional feature space,” which is a “problem [that] has been very well studied.” ’988 patent (Ex. 3) 22:1–3. The specifications suggest that “[a] number of possible data structures are applicable including kd-trees and vantage point trees,” and they cite a handful of articles that describe certain techniques for performing a “nearest neighbor search.” *Id.* at 22:5–6; *see also id.* at 9:29–38. Dr. Cox readily admitted at deposition that his patents do not disclose any novel methods of “neighbor” or “nearest neighbor” searching. Cox Dep. Tr. (Ex. 24) 81:17–25.

Finally, “[t]he set of possible actions” contemplated by the patents “is potentially infinite and includes, for example, retrieving further information” and “receiving discount coupons.” ’988 patent (Ex. 3) 4:31–36. Dr. Cox acknowledged that performing an action in this manner “could well have been known” before he filed his provisional application in September 2000. Cox Dep. Tr. (Ex. 24) 130:21–131:2. Other than the provisional application, neither Network-1 nor Dr. Cox

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has produced or identified any documents, software, or other tangible evidence describing or reflecting Dr. Cox’s purported invention. *See id.* 7:24–8:10; 56:22–57:6.

**B. The Asserted Patent Claims**

Although the specifications of the patents-in-suit paint in broad strokes, the asserted claims are more particular, and it is the claims that matter for present purposes. Because “the claims of a patent define the invention to which the patentee is entitled the right to exclude,” the infringement inquiry turns on a comparison of “the properly construed claims ... to the accused device.” *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004).

Of the twenty-two claims initially asserted by Network-1 in Case No. 14-cv-2396, only one remains part of these cases today. *Compare* Network-1’s Infringement Contentions of July 21, 2014 (Ex. 1) *with* Network-1’s Am. Infringement Contentions of Jan. 31, 2019 (Ex. 2). That lone remaining claim is dependent claim 17 of the ’988 patent, which recites:

**15.** A method for associating an electronic work with an action, the electronic work comprising at least one of audio and video, the method comprising:

- a) electronically extracting features from the electronic work;
  - b) electronically determining an identification of the electronic work based on the extracted features, *wherein the identification is based on a non-exhaustive search identifying a neighbor*;
  - c) electronically determining an action based on the identification of the electronic work; and
  - d) electronically performing the action.
- ...

**17.** The method of claim 15, *wherein the non-exhaustive search is sublinear*.

’988 patent (Ex. 3) 25:65–26:15 (emphasis added). For the reasons Google explained in its claim construction briefing and at the *Markman* hearing, claim 17 is invalid because the term “non-exhaustive search” is indefinite. *See* Section I *infra*. Alternatively, for the reasons set forth below,

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Google's Content ID system does not infringe claim 17 because, for example, the accused searches are not "sublinear" under the agreed construction of that term. *See* Section II *infra*.

Last year, Network-1 asserted for the first time that Google's Content ID system also purportedly infringes claims 33, 34 and 35 of the '237 patent. Independent claim 33 recites:

**33.** A computer-implement method comprising:

a) obtaining, by a computer system including at least one computer, media work extracted features that were extracted from a media work, the media work uploaded from a client device;

b) *determining*, by the computer system, *an identification of the media work using the media work extracted features to perform a sublinear approximate nearest neighbor search of reference extracted features of reference identified media works*; and

c) determining, by the computer system, an action based on the determined identification of the media work.

'237 patent (Ex. 4) 28:5–16 (emphasis added). Google's Content ID system does not infringe claim 33 of the '237 patent or its dependents because, among other things, the accused searches are not "sublinear." *See* Section II *infra*. Moreover, Google's Content ID system also does not meet the combination of elements in step b) of the claim. *See* Section III *infra*.

The third and final patent-in-suit, the '464 patent, issued in December 2014 and was added to this litigation through the filing of Case No. 14-cv-9558. All of the asserted claims of the '464 patent contain the term "non-exhaustive search," which renders them indefinite for the reasons incorporated in Section I *infra*. The claims of the '464 patent also contain another indefinite term ("correlation information"), as well as a series of limitations not present in the asserted claims of the '988 or '237 patents. The issues specific to the '464 patent will be addressed below in Section IV, which explains why its claims are invalid, and Section V, which explains why Google's Content ID system does not infringe them.

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**GOOGLE’S CONTENT ID SYSTEM<sup>1</sup>**

Network-1 alleges that “the Content ID system and its implementation on the YouTube website” infringes the asserted claims. Expert Rep. of Dr. Michael Mitzenmacher Re. Google’s Infringement (Ex. 6) (“Mitzenmacher Rep.”) ¶ 39. YouTube is an online “platform for the exchange of user-generated video content” that Google has owned and developed since 2006. Expert Rep. of Jeffrey H. Kinrich (Ex. 25) ¶ 11. Viewers use YouTube to watch more than a billion hours of video each day, and by some measures it is the second most frequently visited website in the world. *Id.*

According to Network-1’s technical expert, Dr. Michael Mitzenmacher, “Content ID is a set of tools that permits content owners (*e.g.*, companies that own rights to music, television shows, and movies) to control how their content is used on YouTube.” Mitzenmacher Rep. (Ex. 6) ¶ 40. For example, a YouTube user might “upload a video of a dance routine that uses a content owner’s music.” *Id.* ¶ 42. The Content ID system can automatically determine whether the homemade video of the dance routine uses the content owner’s music, “even though the video file uploaded by the user is obviously not an exact match to what is provided by the content owner.” *Id.* To offer another example, “some YouTube users will transform videos in order to try to avoid detection, such as by adding a frame to or cropping a video that contains copyrighted material.” *Id.* This might occur if, for example, a user is trying to upload a pirated copy of a major motion picture. Google’s Content ID system endeavors to determine whether any of the content in a user-

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<sup>1</sup> Insofar as the issues presented by this motion are concerned, there are no disputes of material fact regarding the operation of Google’s Content ID system. For the purpose of this motion, Google will convey the descriptions provided by Network-1’s expert witnesses in recognition that “[a] court reviewing a motion for summary judgment must construe the facts in the light most favorable to the non-moving party and must resolve all ambiguities and draw all reasonable inferences against the movant.” *Beyer v. Cty. of Nassau*, 524 F.3d 160, 163 (2d Cir. 2008).

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uploaded video “matches” any copyrighted video, audio, or melody content, even if the user has altered that copyrighted content. *Id.*; *see* Defs.’ Stmt. of Material Facts (“SMF”) ¶¶ 21–25.

One of the reasons for generating matches in this manner is so that content owners (also known as “partners”) can set policies that dictate what happens when YouTube users reuse their copyrighted content. Mitzenmacher Rep. (Ex. 6) ¶¶ 41–43. For instance, a record label might want to allow people to use some of its songs in homemade videos of dance routines and other creative user-generated content, while a film studio might want to block pirated versions of its movies that are intentionally transformed and uploaded to YouTube. *See id.*; SMF ¶¶ 64–68.

As Network-1’s expert witness observes, “there have been two main versions of Content ID during the relevant time period.” Mitzenmacher Rep. (Ex. 6) ¶ 39. More specifically, there have been two systems for generating matches that were developed at different times by distinct teams of Google researchers and engineers using different algorithms and data structures. *See, e.g., id.* ¶¶ 179, 218. The newer version of Content ID, known as the “Siberia” system, has been in use since 2015. *See id.* The older version of Content ID, which was gradually phased out and replaced by Siberia, was called the “LSH” system because it “used locality sensitive hashing (‘LSH’) for indexing and searching.” *Id.* ¶ 39. At a high level, both versions of the Content ID system compare the video, audio, and melody content of user-uploaded videos to the video, audio, and melody content of known reference videos in order to find instances where the user-uploaded videos reuse the reference videos’ copyrighted content. *See id.* ¶¶ 195, 215, 248; SMF ¶¶ 21–27. In keeping with the approach taken by Network-1’s technical expert, the descriptions that follow focus primarily on the indices of copyrighted video content—as distinct from audio or melody content—“but each of the reference indices [is] structured in the same manner.” Mitzenmacher Rep. (Ex. 6) ¶ 220. The differences between the Siberia and LSH versions, however, are more

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substantial. Accordingly, the two versions will be discussed separately, beginning with the newer Siberia version of the Content ID system.

**A. The Siberia Version of the Content ID System**

**1. Generating Embeddings**

The Siberia version of the Content ID system is based in part on machine learning techniques pioneered in recent years by the Google Brain research team. Mitzenmacher Rep. (Ex. 6) ¶ 179; SMF ¶ 31. In simple terms, every video uploaded to YouTube is processed in a way that creates short snippets (frames) of video, audio, and melody content. *See* Mitzenmacher Rep. (Ex. 6) ¶ 179. These frames are then further processed by a specialized “neural network” developed by Google researchers. *Id.* For each frame of content, the neural network—a form of artificial intelligence—outputs a complex number, or vector, that corresponds to [REDACTED]. *Id.* Each one of these [REDACTED] is referred to as an “embedding.” *Id.*; *see* SMF ¶¶ 28–32.

**2. Indexing of Reference Videos**

If one were to envision all of the embeddings that correspond to all of the frames of content owned by YouTube content partners, there would be [REDACTED]. *See* Mitzenmacher Rep. (Ex. 6) ¶ 179. The Siberia system [REDACTED]. *Id.* ¶ 221. Each of the [REDACTED]. *Id.*; SMF ¶¶ 36–42. The embeddings do not [REDACTED] instead, they are “[REDACTED]” developed by Google that generates values capable of being quickly scanned. *See* Mitzenmacher Rep. (Ex. 6) ¶¶ 218–19. [REDACTED]

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See Mitzenmacher Rep. ¶¶ 220–221, 233; Mitzenmacher Dep. Tr. (Ex. 6) 130:23–131:9; SMF ¶¶ 33–42. The result is a giant “reference index” [REDACTED].  
 [REDACTED]. Mitzenmacher Rep. ¶¶ 218–21. [REDACTED]  
 [REDACTED] to a short snippet of copyrighted content (*e.g.*, a frame of a film owned by a movie studio). *See id.*

### **3. The Siberia Index Lookup**

Whenever a user uploads a new video to YouTube, the Content ID system attempts to determine whether it reuses any of the copyrighted content owned by YouTube partners. Mitzenmacher Rep. (Ex. 6) ¶ 195. Google first processes the new video and uses its neural network to output new embeddings in the manner described above. *Id.* ¶¶ 179, 222. Each embedding (sometimes referred to as a “query” embedding) is then [REDACTED]  
 [REDACTED]

First, each new query embedding is [REDACTED]  
 [REDACTED] according to a particular mathematical measure. *Id.* ¶ 222; SMF ¶¶ 44–48. Second, the same query embedding is [REDACTED]  
 [REDACTED]  
 [REDACTED]s. Mitzenmacher Rep. ¶ 223. The system then outputs [REDACTED]  
 [REDACTED] according to a different mathematical measure. *Id.*; SMF ¶¶ 49–56. In other words, the Siberia version of the Content ID system takes each embedding from a newly uploaded video and:

- (a) scans all [REDACTED];
- (b) returns a [REDACTED];
- (c) scans all [REDACTED]; and
- (d) returns a [REDACTED].



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See Mitzenmacher Rep. (Ex. 6) ¶¶ 222–23; SMF ¶¶ 44–56.

The system repeats this process for the other embeddings associated with the video, audio, and melody content of the newly uploaded video. Mitzenmacher Rep. (Ex. 6) ¶¶ 222–23. The output of this “Index Lookup” is a [REDACTED]

[REDACTED]. *Id.* (Dr. Mitzenmacher’s report sometimes refers to this Index Lookup as the “ScaM search,” in reference to the Scalable Matching (“ScaM”) team of Google researchers in New York City who helped develop it. *Id.* ¶¶ 216, 229.)

**4. Refining, Verifying, and Claiming**

The aforementioned Index Lookup is not the end of the matching process. In the Siberia version, the process involves two more “main stages,” known as the “Sparse” stage and the “Verifier.” Mitzenmacher Rep. (Ex. 6) ¶ 217; SMF ¶ 43.

At the “Sparse” stage, the system uses [REDACTED]

[REDACTED]  
[REDACTED] Mitzenmacher Rep. (Ex. 6) ¶ 225.

In other words, the system [REDACTED]

[REDACTED]  
[REDACTED]. *See id.* [REDACTED]

[REDACTED]  
[REDACTED] *Id.*; see SMF ¶¶ 59–61.

At the “Verifier” stage, the Siberia system retrieves [REDACTED]  
[REDACTED] passed from the preceding step and compares each of them to the query embeddings associated with the newly uploaded YouTube video. Mitzenmacher Rep. (Ex. 6) ¶ 226. In general terms, the algorithms [REDACTED]

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See *id.*; SMF ¶¶ 62–63.

Finally, the matching sequences output by the Verifier are delivered to the Content ID system’s “claiming logic,” which determines whether any of the matching video, audio, or melody content in the newly uploaded video can be automatically “claimed” on behalf of an existing content owner. Mitzenmacher Rep. (Ex. 6) ¶¶ 228, 250. For example, the Verifier might

The claiming logic can determine, among other things,

apply its predetermined policies, which may include blocking the reuse of its song in the YouTube video. See *id.* ¶¶ 251–52; SMF ¶¶ 64–68.

**B. The LSH Version of the Content ID System**

**1. Generating Subfingerprints and LSH Bands**

The prior LSH version of the Content ID system was based on a different set of algorithms from those used in the later-developed Siberia version. See, e.g., Mitzenmacher Rep. (Ex. 6) ¶¶ 171, 197. Like the Siberia version, the LSH version started with modified versions of the short snippets (frames) of video, audio, and melody content of each video uploaded to YouTube, but from that point forward, the LSH version differed in most respects. See *id.* ¶ 171. In simple terms, whereas the Siberia version of the Content ID system creates an “embedding” associated with each frame of a video, the LSH version performed a series of mathematical operations to generate a vector called a “subfingerprint” corresponding to each frame. *Id.*<sup>2</sup> Each “subfingerprint” was

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<sup>2</sup> The full “fingerprint” for the video, audio, or melody content of a video was the collection of its subfingerprints. See Mitzenmacher Rep. ¶ 171.

*Id.* ¶ 173; *see* SMF ¶¶ 69–76.

Mitzenmacher Dep. Tr. (Ex. 7) 273:10–274:10; SMF ¶ 77. The number of “columns” in the index was simply the number of motion pictures, TV shows, and other references in the index. Mitzenmacher Dep. Tr. (Ex. 7) 269:2–8; SMF ¶ 84. For example, if the number of reference videos to be searched doubled from 20 million to 40 million, then the number of “columns” in the LSH index likewise would double from 20 million to 40 million. *See, e.g.*, Mitzenmacher Dep. Tr. (Ex. 7) 272:7–273:3. If a given LSH band was associated with a particular reference video, then the corresponding “cell” in the table would indicate as such; otherwise, the “cell” would be empty. *See id.* 268:9–269:8.

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*See id.* ¶ 198; SMF ¶¶ 80–88. The system would repeat this LSH lookup process using the other LSH bands that were generated from the new user-uploaded video. *Id.*

**4. Filtering, Stage II Matching, and Claiming**

The next steps in the process evaluated whether the “hits” output by the LSH “Index Lookup” for each reference video were [REDACTED] [REDACTED] Stage II” algorithms. *See* Mitzenmacher Rep. (Ex. 6) ¶¶ 201–02. The system then retrieved the full collection of subfingerprints (*i.e.*, the “fingerprint”) corresponding to each reference video that had not yet been eliminated from consideration. *Id.* ¶¶ 203–04. The Stage II algorithms compared the “query” fingerprint from new user-uploaded video with the fingerprints of each reference video passed from the preceding step. *See id.* ¶¶ 204–05; SMF ¶¶ 94–97. Then, any relevant matches were passed to the claiming logic described above to determine whether [REDACTED] claim on behalf of one or more content owners. Mitzenmacher Rep. (Ex. 6) ¶ 207; SMF ¶¶ 98–100.

**ARGUMENT**

**I. THE ASSERTED CLAIMS OF THE ’988 AND ’464 PATENTS ARE INVALID BECAUSE THEY ARE INDEFINITE**

Google respectfully submits that the Court can and should invalidate most of the patent claims asserted by Network-1 without reading past this section. The parties have already briefed, argued, and submitted the question of whether under Section 112 of the Patent Act the term “non-exhaustive search” renders indefinite all of the claims in which it appears. *See, e.g.*, Google’s Resp. Claim Constr. Br. (Dkt. No. 151) at 12–20; Google’s Sur-Reply Claim Const. Br. at 2–12 (Dkt. No. 163); Tr. of Claim Constr. Hearing (Dkt. No. 204) at 71:4–94:2. For the reasons stated in Google’s claim construction briefs and at the *Markman* hearing, this is a legal issue to be decided by the Court, not a jury. *See, e.g.*, Google’s Sur-Reply Claim Constr. Br. (Dkt. No. 163) at 10–

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12; Tr. of Claim Constr. Hearing (Dkt. No. 204) at 44:21–48:24, 64:20–71:3; Google’s Post-Hr’g Ltr. (Dkt. No. 202) at 2–4. In accordance with the parties’ prior representations, Google regards the claim construction hearing “as the summary judgment hearing on indefiniteness” and takes this opportunity to request that the Court enter summary judgment declaring invalid all of the asserted claims of the ’988 and ’464 patents on the ground that they are indefinite.<sup>3</sup> Tr. of Claim Constr. Hearing (Dkt. No. 204) at 44:21–48:24; Aug. 7, 2020 Joint Ltr. (Dkt. No. 221) at 2.

**II. NEITHER VERSION OF GOOGLE’S CONTENT ID SYSTEM MEETS THE  
“SUBLINEAR” LIMITATIONS OF THE ’237 AND ’988 PATENTS**

If the Court finds for Google on the issue of indefiniteness, then all that remains of Network-1’s case are three claims of the ’237 patent. Google is entitled to summary judgment of non-infringement on those claims (and claim 17 of the ’988 patent, if it is not indefinite) because it is beyond dispute that neither version of Google’s Content ID system performs the “sublinear” search required by those claims, which under the parties’ agreed construction is “[a] search whose execution time scales with a less than linear relationship to the size of the data set to be searched, assuming computing power is held constant.” Am. Claim Constr. Chart (Dkt. No. 146) at 2.

**A. The Siberia Version Is Not “Sublinear”**

With respect to the Siberia version of the Content ID system, there can be no question that Google is entitled to summary judgment of non-infringement because Network-1’s expert witness admitted in his report and confirmed at deposition that the Siberia search algorithms scale linearly, rather than sublinearly:

I would like to note that several of Defendants’ technical witnesses testified that if additional references were added to the existing shard/partition structure, the ScaM portion of the search would scale linearly. *I generally agree with this notion.*

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<sup>3</sup> As discussed in Section IV *infra*, the claims of the ’464 patent are invalid for other reasons, including because the term “correlation information” is indefinite.

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Mitzenmacher Rep. (Ex. 6) ¶ 229 (emphasis added and omitted); *see also* Mitzenmacher Dep. Tr. (Ex. 7) 121:18–122:8 (“It is true. I generally agree with that notion.”); SMF ¶¶ 102–06.

Although Network-1’s expert acknowledges (as he must) that the search actually performed by Google is *not* “sublinear,” he nevertheless asserts that Google might choose in the future to modify its system “[r]ather than conducting the search in this inefficient manner.” Mitzenmacher Rep. (Ex. 6) ¶ 230. Speculation about how Google’s linear search might be modified to become sublinear is both irrelevant and unsupported by evidence. It is black-letter law that “[a] device does not infringe simply because it is possible to alter it in a way that would satisfy all the limitations of a patent claim.” *Accent Packaging*, 707 F.3d at 1327. Because there is no evidence that the search actually performed by the Siberia version of the Content ID system is “sublinear” under the agreed construction of that term, Google is entitled to summary judgment that the Siberia system does not infringe the asserted claims of the ’237 and ’988 patents.

**1. Network-1’s Expert Witness Admits That the Siberia Version Is Not “Sublinear”**

To understand why the search performed by the Siberia version of the Content ID system is not “sublinear,” the Court need look no further than the expert report and testimony by Network-1’s technical expert, Dr. Mitzenmacher. As he acknowledged, the Siberia version of the Content ID system searches a fixed fraction of the records in the data set. *See* Mitzenmacher Rep. (Ex. 6) ¶ 222. The algorithm first [REDACTED]

[REDACTED] *Id.* Then it [REDACTED]

[REDACTED] *Id.*; SMF ¶¶ 45–50. Because the Siberia version searches a fixed percentage of the index, it is a paradigmatic example of a *linear* search.

Dr. Mitzenmacher made this very point to the Court last year in his claim construction declaration, where he explained that “[t]here are examples of searches that compare to less than

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all records in a data set that scale linearly, such as those that compare to the same percentage of a random selection of records in the data set regardless of data set size.” Decl. of Michael D. Mitzenmacher in Support of Network-1’s Reply Claim Const. Br. (“Mitzenmacher Reply Decl.”) (Dkt. No. 158-7) ¶ 19. As Dr. Mitzenmacher put it, “a search that compares to a random half of the records does not compare against all records, but the time required for such a search scales linearly with the size of the data set, since it always compares against half of the records.” *Id.*; *see* SMF ¶¶ 105–06. The Siberia version of the Content ID system uses this same technique of always searching a fixed fraction of the data set that Network-1’s expert used to illustrate the concept of a search that scales linearly. *See* Mitzenmacher Rep. (Ex. 6) ¶ 222; SMF ¶¶ 45–50. The lead engineer of the Siberia system explained this straightforward point at her deposition:

Q. I think you talked about some component or portion being – sort of scaling linearly, and I wanted to make sure I understood what you were referring to.

A. Well, you always have to search – the way the ScaM algorithm is set up, you always have to search a fixed portion of the index. I mean, [REDACTED] So that is – yeah. That’s *linear* in the size of the index. And actually, even if we decided to take a different number of top hits, that wouldn’t even help because we still have to do the full scan.

Pasula Dep. Tr. (Ex. 9) 92:8–22 (emphasis added). The Google research scientist who leads Google’s “ScaM team” and helped developed the Siberia system made the same observation:

Q. [S]o I’m going to give you a hypothetical. If you double the number of videos in the data set, but you don’t change the number of partitions or the number of shards, what does that do to the portion of the search that you’ve described?

A. Well, in the current system, it will increase the cost twice. It will slow down by half.

Q. And that’s true because you have [REDACTED]; is that fair?

A. *Because we are doing linear search.*

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Kumar Dep. Tr. (Ex. 10) 50:11–23 (emphasis added, form objection omitted)). In light of this irrefutable evidence that the search scales linearly, Network-1’s expert witness admitted as much in his report and at deposition. Mitzenmacher Rep. (Ex. 6) ¶ 229 (“I would like to note that several of Defendants’ technical witnesses testified that if additional references were added to the existing shard/partition structure, the ScaM portion of the search would scale linearly. I generally agree with this notion.”); Mitzenmacher Dep. Tr. (Ex. 7) 121:18–122:8.<sup>4</sup>

**2. The Assertion That Google Might Change Its System to Make It “Sublinear” Is Irrelevant and Not Supported by Any Evidence**

After acknowledging that the accused Siberia system is not “sublinear,” Network-1 has pivoted to suggesting that Google might choose to modify the system if the number of references increased. Specifically, Dr. Mitzenmacher asserts that if the size of the reference index doubled, then Google would be disappointed that the linear search would end up “taking approximately twice as long” or require a “doubl[ing] of computing resources” and would therefore change “the number of shards and partitions” used in its system, which purportedly “would result in sublinear scaling.” Mitzenmacher Rep. (Ex. 6) ¶¶ 230, 238. This baseless speculation about how the accused system *might* be modified under hypothetical circumstances does not create a genuine dispute concerning any material fact because it is irrelevant as a legal matter and, in any event, is preempted by irrefutable evidence that these changes would not render the search “sublinear.”

First, a finding of patent infringement requires “application of the properly construed claim to the accused product,” not a modified version of the accused product that could be created.

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<sup>4</sup> As Dr. Mitzenmacher acknowledged, a multi-step function with at least one linear component will scale linearly under the agreed construction of that term. *See* Mitzenmacher Dep. Tr. (Ex. 7) 103:11–109:19. To be clear, there is no evidence that any other aspect of the Siberia system performs a “sublinear” search, but even assuming that some other portion of the system were “sublinear,” it is undisputed that the “overall search” would still scale linearly because of the linear search performed by the “ScaM” component. *See, e.g., id.* 107:17–109:11; SMF ¶ 107.



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*Telemac*, 247 F.3d at 1323, 1330; *see, e.g., Accent Packaging*, 707 F.3d at 1327 (“A device does not infringe simply because it is possible to alter it in a way that would satisfy all the limitations of a patent claim.”). That bedrock rule applies to Network-1’s asserted method claims. “A patented method is a series of steps, each of which must be performed for infringement to occur,” and “[i]t is not enough that a claimed step be ‘capable’ of being performed.” *Cybersettle, Inc. v. Nat’l Arbitration Forum, Inc.*, 243 F. App’x 603, 606–07 (Fed. Cir. 2007). In other words, “[a] party that does not perform a claimed step does not infringe a method claim merely because it is capable of doing so.” *Id.*; *see, e.g., Fujitsu Ltd. v. Netgear Inc.*, 620 F.3d 1321, 1329 (Fed. Cir. 2010). Network-1 thus cannot avoid summary judgment by asserting that the Siberia version of the Content ID system *could* exhibit “sublinear scaling” *if* it were modified in particular ways. *See, e.g., TGIP, Inc. v. AT&T Corp.*, 527 F. Supp. 2d 561, 575 (E.D. Tex. 2007) (“The court cannot find, and the parties do not point to, any case where the Federal Circuit holds that a computerized system infringes if it can be reprogrammed into an infringing use.”).

Second, even if Network-1 had articulated a legally cognizable theory of infringement, summary judgment still would be warranted because there is no evidence to support Dr. Mitzenmacher’s assertion that his proposed modifications “would result in sublinear scaling” under the agreed construction of that term. *See* Mitzenmacher Rep. ¶ 238. Recall that Dr. Mitzenmacher speculated that, if the number of references increased, Google would change “the number of shards and partitions” used in its system, which purportedly “would result in sublinear scaling.” Mitzenmacher Rep. (Ex. 6) ¶¶ 230, 238. With respect to the hypothetical increase in *shards*, Dr. Mitzenmacher acknowledged at his deposition that such a change would entail using more machines and hence more computing power. *See* Mitzenmacher Dep. Tr. (Ex. 7) 130:18–131:14; SMF ¶¶ 39, 108. The assertion that Google could increase the amount of computing power

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used to conduct the search does not even arguably suggest that it is “[a] search whose execution time scales with a less than linear relationship to the size of the data set to be searched, *assuming computing power is held constant*.” Am. Claim Constr. Chart (Dkt. No. 146) at 2 (emphasis added); *see* Mitzenmacher Dep. Tr. (Ex. 7) 131:14–133:24. As for the hypothetical increase in the number of *partitions*, that also would not “result in sublinear scaling” because, as Dr. Mitzenmacher acknowledges, the Siberia system is programmed to search a fixed fraction [REDACTED] [REDACTED] *See* Mitzenmacher Dep. Tr. (Ex. 7) 151:13–154:4; SMF ¶¶ 47–48. Specifically, the source code [REDACTED]

[REDACTED] *See* Expert Rep. of Dr. Samrat Bhattacharjee (Ex. 13) (“Bhattacharjee Rep.”) ¶ 302.<sup>5</sup> Thus, if Google decided for some reason to [REDACTED] [REDACTED], and the execution time of the search would continue to scale linearly with the size of the data set to be searched because the system would continue to search the same fixed fraction of the data set. *See* Mitzenmacher Dep. Tr. (Ex. 7) 151:13–152:13, 163:16–164:24. Thus, even implementing Network-1’s hypothetical modifications would not make the accused system “sublinear.”

There is simply no dispute: The Siberia version of the Content ID system does not infringe the asserted claims of the ’237 and ’988 patents because it is not “sublinear.”

**B. The LSH Version Was Not “Sublinear”**

Although the LSH version of the Content ID system used different algorithms than the newer Siberia version discussed in the preceding section, it did not infringe the asserted claims of the ’988 and ’237 patents for the same reason: The system simply did not perform the required

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<sup>5</sup> The system that was built and is used by Google [REDACTED]  
[REDACTED]

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“sublinear” search. Dr. Mitzenmacher’s analysis of this issue is remarkably cursory and nearly devoid of evidence. *See* Mitzenmacher Rep. (Ex. 6) ¶¶ 209–11. Yet even while skirting the “sublinear” limitation, Dr. Mitzenmacher manages to reveal why it is not met. As with the Siberia version, the Court need not address any factual disputes concerning the operation of the system, as the testimony of Network-1’s own expert leads to the ineluctable conclusion that the LSH version of the Content ID system did not meet the “sublinear” limitation.

As discussed above, and as Dr. Mitzenmacher acknowledges, whenever a new reference video was added to the LSH index, the LSH bands associated with that video were populated in the index. *See* Mitzenmacher Dep. Tr. (Ex. 7) 272:7–273:3; SMF ¶¶ 91–93. In conceptual terms, the new reference video received its own new “column” in the LSH index, where each LSH band has its own “row.” *See* Mitzenmacher Dep. Tr. (Ex. 7) 270:12–271:4, 272:7–12; SMF ¶¶ 83–84. The new reference was associated with some number of existing LSH bands, and the corresponding “cell” in the new column was populated accordingly. Mitzenmacher Dep. Tr. (Ex. 7) 272:7–273:3; SMF ¶¶ 91–93. In short, each new reference added to the LSH index becomes a new potential “match” when performing a search or lookup using an LSH band. The number of potential *matches* thus increases along with the number of *references to be searched*.

To offer a simple example: The average lookup of a single LSH band in an index with 20 million references might have been expected to return 50 matches. In other words, each time the system looked up an LSH band from a user-uploaded video, it might return an average of 50 references that contain that exact same LSH band. What would happen if the number of references in the LSH index doubled from 20 million to 40 million? *See* Mitzenmacher Claim Constr. Reply Decl. (Dkt. No. 158-7) ¶ 19. There is no evidence suggesting that the average number of *matches* also would not have at least doubled from 50 to 100, given that each new reference was associated

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with the existing finite set of LSH bands. *See* Mitzenmacher Dep. Tr. (Ex. 7) 272:7–273:3; SMF ¶¶ 77–78, 92–93. Put another way, Network-1 has not presented any argument or evidence that the number of *matches* scales in a way that is less than proportional to the number of *references to be searched*. *See* Mitzenmacher Dep. Tr. (Ex. 7) 268:9–269:8, 272:7–273:2, 274:19–275:2; SMF ¶¶ 112–115. This omission sinks Network-1’s infringement case.

By his own account, Dr. Mitzenmacher concedes that the “Index Lookup” performed by the LSH version of the Content ID system returns its results “in time proportional to the number of matches.” Mitzenmacher Rep. (Ex. 6) ¶ 211. For the reasons just discussed, in the LSH index, the number of *matches* is a function of the number of *references to be searched* because each reference is associated with some of the existing finite set of LSH bands. *See* Mitzenmacher Dep. Tr. (Ex. 7) 272:7–273:3; SMF ¶¶ 77–78, 92–93. As a consequence, Dr. Mitzenmacher’s statement that the LSH lookup returns its results “in time proportional to the number of *matches*” is no different from the observation that it returns its results in time proportional to the number of *references to be searched*. Mitzenmacher Rep. (Ex. 6) ¶ 211 (emphasis added); SMF ¶¶ 112–115. And that is the very meaning of a linear search under the parties’ agreed construction. *See* Mitzenmacher Reply Decl. (Dkt. No. 158-7) ¶ 19 (“[A] linear search is a search whose execution time scales proportionately with the size of the data set to be searched.”). When he was confronted with the fact that his own analysis demonstrates that the LSH version scales linearly, Dr. Mitzenmacher literally had no answer, because there is none. *See* Mitzenmacher Dep. Tr. (Ex. 7) 280:12–21 (“Q. So as you sit here today, can you tell me that I’m wrong that that function is necessarily linear? A. Again, it – I would want to check the assumptions, you know, I – being a deposition where I’m supposed to give answers I’m completely sure, I would not want to give an on-the-fly answer to – to such a question.”) (form objection omitted)); *see also id.* 273:10–281:5.

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With no expert analysis to support its assertion that the LSH system is sublinear, the only “evidence” Network-1 can muster consists of isolated uses of that term by a Google witness and in Google documents that are uninformed by the parties’ agreed construction and thus do not shed light on whether the LSH version is “sublinear” under the meaning of that term in this case. *See* Mitzenmacher Rep. (Ex. 6) ¶ 209. Indeed, the deposition testimony cited by Network-1’s expert makes clear that the witness was applying an altogether different meaning of “sublinear,” namely whether a search “consider[s] all the elements in our repository without having to examine them in detail.” Baluja Dep. Tr. (Ex. 26) 138:3–22. That meaning is plainly different from the parties’ agreed construction—which is not surprising, given that Network-1 never showed the witness the agreed-upon construction at any point during the deposition. *See id.*<sup>6</sup> Network-1 cannot avoid summary judgment by citing documents and testimony that use the term “sublinear” without applying the agreed-upon construction. *See, e.g., Rembrandt Vision Techs., L.P. v. Johnson & Johnson Vision Care, Inc.*, 725 F.3d 1377, 1382–83 (Fed. Cir. 2013); *MyMail, Ltd. v. Am. Online, Inc.*, 476 F.3d 1372, 1378 n.1 (Fed. Cir. 2007) (holding that evidence based on a definition contradicting the patent specification and inconsistent with the court’s claim construction “does not create a genuine issue of material fact” for purposes of avoiding summary judgment).<sup>7</sup>

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<sup>6</sup> As the witness’ answer reflects, the terms “linear” and “sublinear” have multiple meanings in the field of algorithmic search techniques. Bhattacharjee Rep. (Ex. 13) ¶ 273 (“For example, the Dictionary of Algorithms and Data Structures maintained by the National Institute of Standards and Technology defines a ‘linear search’ as a ‘[s]earch [of] an array or list by checking items one at time,’ also known as ‘sequential search.’”). The only construction of “sublinear” that matters for the purpose of evaluating infringement is the one that the parties agreed to apply.

<sup>7</sup> All that leaves is Dr. Mitzenmacher’s conclusory assertion that the system is “sublinear,” but that is not enough to survive summary judgment. *See, e.g., TechSearch*, 286 F.3d at 1372 (explaining that “the conclusory statements of experts” are insufficient “to raise a genuine issue of material fact precluding summary judgment”).

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Just as with the Siberia version, Google is entitled to summary judgment of non-infringement of claims 33–35 of the ’237 patent and claim 17 of the ’988 patent, because the LSH Version of the Content ID system was indisputably *not* sublinear.

**III. NEITHER VERSION OF GOOGLE’S CONTENT ID SYSTEM MEETS THE REMAINING LIMITATIONS OF THE ’237 PATENT**

Even assuming, contrary to all evidence, that either version of the Content ID system performed a “sublinear” search, Google would still be entitled to summary judgment that it does not infringe the asserted claims of the ’237 patent. Step b) of claim 33 of the ’237 patent contains a bundle of interrelated limitations, each of which must be present in the accused system in order for it to infringe that claim and its dependents. *See Seal-Flex*, 172 F.3d at 842 (“To show infringement of a patent, a patentee must supply sufficient evidence to prove that the accused product or process contains, either literally or under the doctrine of equivalents, every limitation of the properly construed claim.”). Specifically, step b) of claim 33 requires “determining, by the computer system, an identification of the media work [i] using the media work extracted features [ii] to perform a sublinear approximate nearest neighbor search [iii] of reference extracted features of reference identified media works.” ’237 patent (Ex. 4) 28:10–14 (bracketed numerals added).

**A. The Siberia Version Does Not “Perform a Sublinear Approximate Nearest Neighbor Search of Reference Extracted Features”**

As discussed above, the only aspect of the Siberia version of the Content ID system that Network-1 has identified as even *potentially* “sublinear” is the “Index Lookup.” *See* Mitzenmacher Rep. (Ex. 6) ¶¶ 229–40; SMF ¶¶ 118–19. That means, in order to satisfy step b) of claim 33, Network-1 must show that the allegedly sublinear Siberia Index Lookup uses media work extracted features to perform an “approximate nearest neighbor search of reference extracted features.” Aside from the fact that the Index Lookup is not sublinear, Google is entitled to summary judgment with respect to this claim (and its dependents) for the separate and independent

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reason that there is no evidence that the Siberia Index Lookup uses media work extracted features to perform an “approximate nearest neighbor search” or that it is a search “of reference extracted features.” In fact, Dr. Mitzenmacher *admits* that the Index Lookup does not meet those limitations and, instead, tries to mix and match different aspects of the Siberia system to show infringement. Because the claim language plainly does not permit Network-1 to pick-and-choose from among the various stages of the system, Network-1 cannot demonstrate that the Siberia system infringes claims 33–35 of the ’237 patent.

**1. Network-1’s Expert Admits That the Siberia Index Lookup Is Not an “Approximate Nearest Neighbor Search”**

In order to infringe the asserted claims of the ’237 patent, the accused system must, among other things, “perform a sublinear approximate nearest neighbor search.” Network-1’s expert admitted at deposition, however, that the purportedly “sublinear” Siberia Index Lookup is *not* an “approximate nearest neighbor search,” which, under the parties’ agreed construction is “a search using an algorithm designed to identify a close, but not necessarily exact or the closest, match of a feature vector, compact electronic representation, or set of extracted features to another, wherein the distance or difference between the two feature vectors, compact electronic representations, or sets of extracted features falls within a defined threshold.” Am. Claim Constr. Chart (Dkt. No. 146) at 2; *see* Mitzenmacher Dep. Tr. (Ex. 6) 324:16–326:16; SMF ¶¶ 120–25. On that point, the parties agree.

As Dr. Mitzenmacher explains in his report, the Siberia system returns [REDACTED] [REDACTED] irrespective of their “distance or difference” from the query embedding. Mitzenmacher Rep. (Ex. 6) ¶ 223. In other words, the search returns [REDACTED] regardless whether [REDACTED] is very similar to the query or very different. *See id.*; SMF ¶¶ 51–56, 123–24. As a result, the Index Lookup is not a search “wherein the distance or



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difference” between the query and the results “falls within a defined threshold,” as the agreed construction of “approximate nearest neighbor search” expressly requires. Dr. Mitzenmacher therefore acknowledged (as he must) that “the actual threshold may have to be a combination of thresholds in this setting to meet the claim level requirements” and asserted that “there are other steps that it works in conjunction with or come later” that purportedly supply the “defined threshold” required by the term “approximate nearest neighbor search.” Mitzenmacher Dep. Tr. (Ex. 7) 325:9–326:16.

Crucially, however, there is no expert opinion or other evidence that these “other steps” in the Siberia version of the Content ID system perform the required “sublinear” search. *See* SMF ¶¶ 118–19. Even assuming, *arguendo*, that the Siberia system eventually performs an “approximate nearest neighbor search” at one of these other stages, it indisputably does not do so in connection with the purportedly “sublinear” Index Lookup. And that is a fatal flaw in Network-1’s infringement case. Claim 33 does not require “performing a sublinear search” and then “performing an approximate nearest neighbor search.” Instead, claim 33 unambiguously requires that the accused system “perform a sublinear approximate nearest neighbor search,” with “sublinear” plainly modifying “approximate nearest neighbor search.” Because Network-1 has not and cannot identify any such search performed by the Siberia system, Google is entitled to summary judgment that the Siberia version does not infringe the asserted claims of the ’237 patent.

**2. There Is No Evidence That the Siberia Index Lookup Performs a Search “of Reference Extracted Features”**

Nor is there any evidence that the Siberia system meets the last limitation of step b) of claim 33 of the ’237 patent, which requires “determining, by the computer system, an identification of the media work using the media work extracted features to perform a sublinear approximate nearest neighbor search *of reference extracted features of reference identified media works.*”



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'237 patent (Ex. 4) 28:10–14 (emphasis added). Once again, the only aspect of the Siberia system that Network-1 contends is allegedly sublinear is the Index Lookup. But even if it were sublinear (it is not), and even if it were an approximate nearest neighbor search (it is not), the Index Lookup indisputably is *not* a search “*of* reference extracted features of reference identified media works.”

As discussed above, the Index Lookup searches [REDACTED]  
[REDACTED] See Mitzenmacher Rep. (Ex. 6) ¶¶ 219–23; SMF ¶¶ 33–34; 44–52. Conspicuously absent from Dr. Mitzenmachers 297-page infringement report, however, is any opinion that [REDACTED] are “extracted features.” See SMF ¶¶ 126–27. They are not.<sup>8</sup> As Dr. Mitzenmacher’s report makes clear, the [REDACTED] are not extracted from a media work and do not even correspond to a work; rather, they are [REDACTED]  
[REDACTED] See Mitzenmacher Rep. (Ex. 6) ¶ 221; SMF ¶¶ 37–38. The hash values likewise are not taken from the work itself and are not representations of the work, but instead [REDACTED]  
[REDACTED] See Mitzenmacher Rep. (Ex. 6) ¶ 219; SMF ¶¶ 33–35.

Needless to say, the process of generating these [REDACTED] involves sophisticated engineering, and there is no evidence or opinion in the record that could indicate to a jury how they meet the limitation of “reference extracted features of reference identified media works” in claims 33–35 of the '237 patent. Dr. Mitzenmacher apparently concluded (for good reason) that he cannot offer an expert opinion that [REDACTED]  
[REDACTED] are “extracted features.” Accordingly,

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<sup>8</sup> The parties have offered competing constructions of the term “extracted features,” but the grant of summary judgment on this basis does not hinge on the Court’s resolution of that claim-construction dispute, as Network-1 has no evidence that [REDACTED] are extracted features under either party’s construction.

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Google is entitled to summary judgment that the Siberia system does not infringe the asserted claims of the '237 patent.

**B. The LSH Version Did Not “Perform a Sublinear Approximate Nearest Neighbor Search of Reference Extracted Features”**

The LSH version of the Content ID system likewise did not infringe the asserted claims of the '237 patent because it did not practice the interrelated limitations of step b) of claim 33 even assuming, contrary to all evidence, that it performed a “sublinear” search. Specifically, the LSH version of the Content ID system did not infringe the asserted claims of the '237 patent because the purportedly “sublinear” index lookup is not an “approximate nearest neighbor search” under the parties’ agreed construction of that term.

The LSH version of the Content ID system, like the newer Siberia version, included multiple stages, which Dr. Mitzenmacher labels “Stage I” and “Stage II.” Mitzenmacher Rep. (Ex. 6) ¶ 197. As Dr. Mitzenmacher explains, “Stage I begins by searching an index of the LSH bands of the reference works for any LSH bands that are exact matches to any of the LSH bands of the user-uploaded video.” *Id.* ¶ 198; *see* SMF ¶¶ 79–80. Critically for present purposes, this “Stage I” Index Lookup is the only portion of the LSH system that Network-1 even alleges might perform the “sublinear” search required by the asserted claims of the '237 patents. *See* Mitzenmacher Rep. (Ex. 6) ¶¶ 209–14. There is no evidence in Dr. Mitzenmacher’s report or anywhere else in the record that “Stage II” or some other portion of the LSH system somehow performed a “sublinear” search. *See* SMF ¶¶ 128–29.

Of course, not any “sublinear” search will do, as the asserted claims of the '237 patent require, among other things, that the accused system “perform a *sublinear approximate nearest neighbor search* of reference extracted features of reference identified media works.” '237 patent (Ex. 4) 28:10–14 (emphasis added). And it is beyond dispute that the purportedly “sublinear”

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Stage I Index Lookup entailed “searching an index of the LSH bands of the reference works for any LSH bands *that are exact matches* to any of the LSH bands of the user-uploaded video.” Mitzenmacher Rep. (Ex. 6) ¶ 197 (emphasis added); *see also* Mitzenmacher Dep. Tr. (Ex. 7) 235:1–8 (“And similarly, if there is a reference video that does not have any LSH bands that match any of the LSH bands of the probe, that video will not be returned by this stage? A. I believe that’s correct. Q. Because it’s doing an exact match of LSH bands? A. Yes.”); SMF ¶¶ 82–87. The Stage I LSH Index Lookup was thus a textbook example of a search for an exact match, rather than an “approximate nearest neighbor search,” which the parties agreed is “a search using an algorithm designed to identify *a close, but not necessarily exact or the closest, match* of a feature vector, compact electronic representation, or set of extracted features to another, *wherein the distance or difference* between the two feature vectors, compact electronic representations, or sets of extracted features *falls within a defined threshold.*” Am. Claim Constr. Chart (Dkt. No. 146) at 2 (emphasis added).

In a rather remarkable turn, Network-1 nevertheless intimates that the LSH version’s search for “exact matches” satisfies the agreed construction of “approximate nearest neighbor search.” Specifically, Dr. Mitzenmacher asserts that “the ‘distance’ is considered too high if no bands (features) match, but it is considered sufficient in this first stage if any bands match exactly.” Mitzenmacher Rep. (Ex. 6) ¶ 198. Network-1’s suggestion that a search that always and only returns an exact match can nevertheless be an “approximate nearest neighbor search” not only flies in the face of the agreed construction, but also flatly contradicts statements that Network-1 made to the U.S. Patent and Trademark Office in defending the validity of the asserted patents. For example, in response to Google’s petition for *inter partes* review (IPR) of the ’237 patent,

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Network-1 specifically distinguished certain prior art references because they searched for an “exact match” rather than the required search for a “neighbor”:

Levy teaches using *exact match comparisons rather than neighbor searches* to identify a match using a[n] extracted hashed fingerprint.

...

Similar to Levy, *the search* disclosed in Iggulden *is not a ‘neighbor’ search but rather is an exact match search* based on the ‘unique signature’ extracted using a hash code.

IPR2015-000345, Network-1’s Prelim. Resp. (Ex. 14) at 1, 43 (emphasis added). Network-1 elaborated on this point in response to another Google petition, telling the Patent Office that the prior art at issue (Conwell) did not satisfy the “neighbor” search element because it described using a lookup table to return exact matches between hash values rather than “neighbors”:

The lookup table disclosed in Conwell used to compare the hashed extracted features of the reference works and the work to be identified *uses an exact search rather than a neighbor search*.

...

A neighbor search—a search that identifies ‘a close, but not necessarily exact or closest, match’—*can* identify an exact match; however, it *must* also be able to identify a close match. The lookup table search in Conwell cannot identify a close match.

IPR2015-00348 Network-1’s Resp. (Ex. 16) at 13–14 (emphasis added). In the words of Network-1’s expert at the time, “[i]f a search necessarily identifies an exact or the closest match ... it is not a neighbor or near neighbor search because it is not a ‘search that identif[ies] a close, but not necessarily exact or closest, match.’” IPR2015-00345, Decl. of Dr. George Karypis (Ex. 15) ¶ 92. Those representations to the Patent Office are fatal to Network-1’s claim of infringement here.

Not surprisingly, the law precludes Network-1 “from recapturing through claim interpretation specific meanings disclaimed during prosecution.” *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir. 2003). The principle applies with equal force where, as here, the statements were made in an IPR proceeding. *Alyus Networks, Inc. v. Apple Inc.*, 856 F.3d

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1353, 1360 (Fed. Cir. 2017) (“Extending the prosecution disclaimer doctrine to IPR proceedings will ensure that claims are not argued one way in order to maintain their patentability and in a different way against accused infringers.”). Accordingly, Network-1 cannot be heard to argue that the search of the LSH index for an “exact match” satisfies the agreed construction of “approximate nearest neighbor search.” *See, e.g., Cordis Corp. v. Boston Sci. Corp.*, 658 F.3d 1347, 1357 (Fed. Cir. 2011) (concluding that the Court “must disregard the testimony of [the patent owner’s] expert that the [accused product] has two crests and a trough because ... that testimony was based on an incorrect understanding of the claim construction”).

Stripped of its argument that an “exact match” somehow constitutes an “approximate nearest neighbor search,” there is no evidence that the “Stage I” LSH Index Lookup meets this limitation. *See* SMF ¶¶ 128–35. And because Network-1 has not pointed to any other search that is purportedly “sublinear,” Google is entitled to summary judgment that the LSH version of the Content ID system does not “perform a sublinear approximate nearest neighbor search” and thus does not infringe the asserted claims of the ’237 patent.

**IV. THE ASSERTED CLAIMS OF THE ’464 PATENTS ARE INVALID**

The claims of the final patent at issue—the ’464 patent—contain their own bundle of limitations that also do not map onto Google’s Content ID system, as discussed below in Section V. But without even considering the irrefutable evidence of non-infringement, the Court can and should dispose of the asserted claims of the ’464 patent on any of three independent grounds.

First, all of the asserted claims of the ’464 patent are invalid because they contain the term “non-exhaustive ... search,” which renders them indefinite for the reasons previously articulated in Google’s claim construction submissions and at the *Markman* hearing. *See* Section I *supra*.

Second, all of the asserted claims of the ’464 patent are invalid because they contain the term “correlation information,” which likewise is indefinite under the standard imposed by Section

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112 of the Patent Act. *See Nautilus*, 572 U.S. at 901, 909–10. This issue has been briefed and submitted, and Google respectfully refers the Court to its claim construction briefs and accompanying papers. *See, e.g.*, Google’s Resp. Claim Constr. Br. (Dkt. No. 151) at 20–22; Google’s Sur-Reply Claim Constr. Br. (Dkt. No. 163) at 12–14.

Third, the ’464 patent suffers a fatal defect that is apparent on its face—one that Network-1 could have, but did not, attempt to correct. Although the application that led to the ’464 patent was not filed until March 13, 2013, it claims a priority date of September 14, 2000, based on a series of intermediate filings that the patent characterizes as “continuation[s].” *See* ’464 patent cover page. In particular, the ’464 patent’s chain of priority depends upon the assertion that “application No. 11/445,928” (the “’928 application”), which is now the ’988 patent, “is a continuation of application No. 09/950,972” (the “’972 application”), which is “now Pat. No. 7,058,223” (the “’223 patent”):

But this assertion is indisputably inaccurate. As Network-1’s patent prosecution counsel acknowledged at his deposition, the ’928 application filed in 2006 is not “a continuation of” the ’972 application filed in 2001:

Q. Can you tell now whether the mischaracterization of the 928 application as a continuation of the 972 application was corrected during prosecution?

A. It doesn’t appear like it was.

Q. *So there is a mistake on the face of the ’464 Patent, right?*

A. *There appears to be, yes.*

Halpern Dep. Tr. (Ex. 17) 213:14–21 (emphasis added). The ’928 application referenced above is not a continuation of the earlier ’972 application, but rather a *continuation-in-part*. *Id.* 209:16–211:17; *see* SMF ¶¶ 136–38. “The difference ... is that a continuation contains the same disclosure found in an earlier application, whereas a continuation-in-part contains a portion or all of the

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disclosure of an earlier application together with added matter not present in the earlier application.” *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1321 n.2 (Fed. Cir. 2008).<sup>9</sup>

Anyone who is not steeped in the niceties of patent prosecution naturally may wonder what difference it makes that Network-1 failed to disclose that the ’464 patent traces its lineage through a continuation-in-part that added matter not present in the earlier application instead of a continuation. After all, Google eventually was able to figure out the true relationship between the applications. The error on the face of the ’464 patent matters, however, because the governing statute and regulations expressly require that an applicant provide an accurate statement of the relationship between the earlier filed applications that support the purported priority date. In order to claim the benefit of an earlier filing date, the application must “contain a specific reference to the earlier filed application.” 35 U.S.C. § 120. In particular, “the reference required ... must be included in an application data sheet” and “also must identify the relationship of the applications, namely, whether the later-filed application is a continuation, divisional, or continuation-in-part of the prior-filed nonprovisional application.” 37 C.F.R. § 1.78(d)(2); *see also* MPEP § 211.02 II (9th ed. Mar. 2014) (“To specify the relationship between the applications, applicant must specify whether the application is a continuation, divisional, or continuation-in-part of the prior application. Note that the terms are exclusive. An application cannot be, for example, both a ... continuation and a continuation-in-part of the same application.”).

Courts have held repeatedly that “both § 120 and regulation 1.78 ... require a specific reference to each prior-filed application in precise detail.” *Droplets, Inc. v. E\*TRADE Bank*, 887 F.3d 1309, 1317 (Fed. Cir. 2018); *see id.* at 1316 (“Although § 120 might appear to be a technical

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<sup>9</sup> Although Network-1 has been aware of this inaccuracy since at least September 7, 2019, it has not taken steps to attempt to correct the error, such as surrendering the ’464 patent to the Patent Office and attempting to have it reissued. *See* SMF ¶¶ 139–41.



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provision,’ courts have long-recognized that ‘it embodies an important public policy,’ and thus have required strict adherence to its requirements.”). An applicant does not satisfy the strictures of Section 120 and its implementing regulations if, for example, it inadvertently omits one of the intermediate applications in the chain of priority. *See, e.g., Medtronic CoreValve, LLC v. Edwards Lifesci. Corp.*, 741 F.3d 1359, 1364–66 (Fed. Cir. 2014) (concluding that “because intermediate U.S. Applications 6 and 8 failed to specifically reference the earlier filed applications in the priority chain, the [asserted] patent is not entitled to claim the priority date” and explaining that “[t]he patentee is the person best suited to understand the genealogy and relationship of her applications” such that “a requirement for her to clearly disclose this information should present no hardship”). Likewise, an applicant runs afoul of the statute and accompanying regulations where, as here, it misstates the relationship between the applications that support its claimed priority date. *See, e.g., Simmons, Inc. v. Bombardier, Inc.*, 328 F. Supp. 2d 1188, 1201 (D. Utah 2004) (“To be sure, the 594 patent does contain a reference to the 231 application and the date of priority which is claimed and merely misidentifies the claimed proper relationship of the applications.... However, it seems clear that not only is it appropriate to require a statement of some relationship in an application, but a statement of the *correct* relationship. Parties viewing a patent and taking legal risks based upon it are entitled to know the correct relationship of the applications.”).

The ’464 patent’s chain of priority is inaccurate, and the consequences of that misstatement are clear. The earliest priority date potentially available to the ’464 patent is June 2, 2006, *i.e.*, the filing date of the ’928 application. *See Medtronic*, 741 F.3d at 1362. With a priority date of June 2, 2006, the very patent application to which the ’464 patent attempted to claim priority is prior art, because that application was published on March 14, 2002, more than one year before the filing of the ’928 application. U.S. Patent Pub. No. 2002/0032698 (Ex. 20); *see* 35 U.S.C. § 102(b)



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(2006). That is, by operation of law, Network-1's own prior published patent application invalidates its later patent. Expert Rep. of Dr. Trevor Darrell (Ex. 23) ¶¶ 546–47. Specifically, Network-1's assertion that the '464 patent should be entitled to a priority date prior to June 2, 2006 necessarily requires that the links in the priority chain, including the published '972 application, describe the limitations of the asserted claims of the '464 patent. *See Natural Alternatives Int'l, Inc. v. Iancu*, 904 F.3d 1375, 1383 (Fed. Cir. 2018) (“An applicant can obtain an earlier effective filing date for claims in a CIP [continuation-in-part] application only if those claims find support in an earlier-filed nonprovisional application. Claims reciting new matter, however, are entitled to only the filing date of the CIP application and not to the filing date of the earlier-filed application.”). Accordingly, the asserted claims of the '464 patent are invalid under 35 U.S.C. § 102(b) (2006). *See Medtronic*, 741 F.3d at 1367 (“Because Medtronic failed to specifically reference each earlier filed application in the intervening applications in the chain of priority for the [asserted] patent under 35 U.S.C. § 120, the district court was correct to limit the priority date of the patent to no earlier than April 10, 2003 and thereafter find the Asserted Claims invalid as anticipated.”).

**V. NEITHER VERSION OF GOOGLE'S CONTENT ID SYSTEM INFRINGES THE ASSERTED CLAIMS OF THE '464 PATENT**

Finally, even if the asserted claims of the '464 patent were not invalid, Google would be entitled to summary judgment on the basis that its Content ID system does not infringe those claims. All of the asserted claims of the '464 patent require performance of a sequence of steps involving, among other things, multiple communications between a “computer system” and a “user electronic device.” For example, claim 1 of the '464 patent recites “[a] method comprising,” among other things, the following steps:

[e] generating, by the computer system, a tag associated with the first electronic media work;

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[f] providing, from the computer system to a user electronic device, the first electronic media work and the associated tag;

[g] obtaining, by the computer system from the user electronic device, a request related to the associated tag;

[h] generating, using the computer system, machine-readable instructions based upon the associated information to be used in performing, at the user electronic device, the action; and

[i] providing, from the computer system to the user electronic device, the machine-readable instructions to perform the action in response to the request.

'464 patent (Ex. 5) 24:43–25:3 (bracketed letters added); SMF ¶¶ 17–20.

Network-1's theory is that Google infringes this claim when a YouTube user watches a video that was previously "claimed" through the Content ID system (*i.e.*, the system found at least one instance of reuse of content owned by copyright holder) and Google serves a clickable advertisement along with the video. *See* Mitzenmacher Rep. (Ex. 6) ¶¶ 351–73; SMF ¶¶ 143–49. As relevant here, it is by serving a clickable ad that Google allegedly infringes steps [e] through [i] of the claims. *See id.* According to Dr. Mitzenmacher, steps [e] and [f] are met because "the various pieces of information generated that relate to the button, banner, and/or link displayed on the watch page of a monetized user-uploaded video [*i.e.*, a video with which an ad is served] are tags." Mitzenmacher Rep. (Ex. 6) ¶ 351. Dr. Mitzenmacher further asserts that "[s]ome of those tags are comprised of a URL"—a "uniform resource locator," commonly known as a website address, such as [www.advertiser.com](http://www.advertiser.com)—which purportedly constitutes the "machine-readable instructions" required by steps [h] and [i]. *Id.* ¶¶ 351, 368. Network-1 thus contends that clickable advertisements served by YouTube may contain the address of a web page provided by the advertiser (which Network-1 contends are "machine-readable instructions") together with other

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information (which Network-1 contends is a “tag”). *See id.*; Mitzenmacher Dep. Tr. (Ex. 7) 478:8–10, 480:24–481:5, 483:7–11; SMF ¶¶ 143–49.

Network-1’s read leaves no room for step [g] of the claim, which requires “obtaining, by the computer system from the user electronic device, a request related to the associated tag.” So Dr. Mitzenmacher performed surgery on the claim, effectively excising step [g] from its original location and tacking it onto the end by asserting that YouTube “obtains from the user electronic device ... a request related to the tag” in the form of “a request to visit the advertiser’s linked website resulting from the user clicking on an item containing the link.” Mitzenmacher Rep. (Ex. 6) ¶ 364. In this way, Network-1’s theory of infringement rests on a wholesale revision of the claim language, whereby steps [f] and [i] are performed simultaneously (when YouTube provides a clickable advertisement, which purportedly includes both a “tag” and “machine-readable instructions”), and step [g] is then performed later (when a user “request[s] to visit the advertiser’s linked website” by “clicking on an item containing the link”). *See id.* ¶¶ 351, 364, 368.

Google is entitled to summary judgment because the steps of the asserted claims of the ’464 patent must be performed in order, yet Network-1’s theory of infringement depends on resequencing the steps. *See* SMF ¶¶ 150–52. Although not every patent claim mandates that its steps be performed in the order in which they appear, “a claim requires an ordering of steps when the claim language, as a matter of logic or grammar, requires that the steps be performed in the order written, or the specification directly or implicitly requires an order of steps.” *Mformation Techs., Inc. v. Research in Motion Ltd.*, 764 F.3d 1392, 1398–99 (Fed. Cir. 2014). That standard is clearly satisfied here. The final step of the claim (*i.e.*, step [i]) requires “providing, from the computer system to the user electronic device, the machine-readable instructions to perform the action *in response to the request.*” ’464 patent (Ex. 5) 25:1–3 (emphasis added). The claims thus

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require that the computer system obtain the “request” described in step [g] *before* providing the “machine-readable instructions” described in step [i]. If the order were reversed, then the “machine-readable instructions” could not be provided “in response to the request.” *See, e.g., Function Media LLC v. Google, Inc.*, 708 F.3d 1310, 1320 (Fed. Cir. 2013) (concluding that where “[t]he claim clearly states that the ‘processing’ is done to the ‘electronic advertisement,’” the claim steps must be performed in order because “[i]t follows that the creation of the ad must happen before the processing begins”).

Under Network-1’s theory of infringement, however, the computer system receives the “request” described in step [g] only *after* providing the “machine-readable instructions” described in step [i]. *See* SMF ¶¶ 150–52. That is the inevitable consequence of Network-1’s assertion that the claimed “machine-readable instructions” are “the URL” associated with an advertisement and the claimed “request” is “the user clicking on the link” to visit the advertiser’s webpage. *See* Mitzenmacher Rep. (Ex. 6) ¶¶ 364, 368, 372; Mitzenmacher Dep. Tr. (Ex. 7) 482:1–8 (“Q. [I]n the situation where the – where the machine-readable instructions is the URL for the ad, the obtaining of the request related to the associated tag is happening after the instruction is provided to the user electronic device because they need that to be able to click on it, right? A. I believe so.” (form objection omitted)); SMF ¶¶ 153–57.

It is clear that the logic and grammar of the claims “requires that the steps be performed in the order written.” *Mformation Techs.*, 764 F.3d 1392 at 1398–99. But if there were any doubt, Network-1 resolved it during prosecution of the ’464 patent, when it explained that during an interview the patent examiner “agreed that specifying the temporal sequence of claimed steps, particularly the claimed steps of generating instructions to be used in performing the action and providing the instructions to perform the action, would render the outstanding rejection moot.”

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'464 Patent File History, Office Action Resp. of Nov. 26, 2013 (Ex. 19) at 12. As Network-1 told the PTO, the steps of the asserted claims of the '464 patent are set forth in a specific temporal sequence. SMF ¶ 158. Network-1 cannot alter that sequence in an attempt to create the illusion of infringement. And because Network-1 has no evidence that Google performs the steps of the asserted claims of the '464 patent in the order in which they appear, Google is entitled to summary judgment. *See* SMF ¶¶ 153–57.

**VI. CONCLUSION**

For the foregoing reasons, Google respectfully submits that the Court should enter summary judgment in its favor on the grounds that (I) the asserted claims of the '988 and '464 patents are invalid because the term “non-exhaustive search” is indefinite and (II) neither version of Google’s Content ID system performs the “sublinear” search required by the asserted claims of the '237 and '988 patents. In the alternative, or in addition, Google respectfully requests that the Court enter summary judgment on the grounds that (III) neither version of Google’s Content ID system meets the remaining limitations of the asserted claims of the '237 patent, (IV) the asserted claims of the '464 patent are invalid because the term “correlation information” is indefinite or because those claims are anticipated by Network-1’s own prior application, and (V) the asserted claims of the '464 patent are not infringed.

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**CERTIFICATE OF SERVICE**

I hereby certify that on November 11, 2020, I electronically filed the foregoing Memorandum of Law in Support of Defendants' Motion for Summary Judgment using the CM/ECF system which will send notification of such filing to all counsel of record in this matter who are on the CM/ECF system.

/s/ Andrew V. Trask  
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